

## 451.5 Payment

The area measured as specified above will be paid for at the Contract Unit Price per square yard (meter). Payment is full compensation for equipment, tools, labor, incidentals to complete the work, including but not limited to:

- Removing existing asphaltic concrete patching material or the spalled, broken, or damaged Portland cement concrete
- Cleaning the open area by sandblasting
- Furnishing, placing, finishing, and curing the patching material
- Sawing and sealing new transverse and longitudinal joints

Payment will be made under:

Item No. 451	Patching Portland cement concrete pavement	Per square yard (meter)
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### 451.5.01 Adjustments

General Provisions 101 through 150.

## **Section 452—Full Depth Slab Replacement**

### 452.1 General Description

This work includes replacing Portland cement concrete pavement slabs, full or partial length. Remove the slabs according to the Plans or as directed by the Engineer. See Section 609.

#### 452.1.01 Definitions

General Provisions 101 through 150.

#### 452.1.02 Related References

##### A. Standard Specifications

Section 431—Grind Concrete Pavement

Section 461—Sealing Roadway and Bridge Joints and Cracks

Section 504—Twenty-Four Hour Accelerated Strength Concrete

Section 609—Removal of Portland Cement Concrete Roadway Slabs

Section 833—Joint Fillers and Sealers

Section 853—Reinforcement and Tensioning Steel

Section 886—Epoxy Resin Adhesives

##### B. Referenced Documents

GDT 72

#### 452.1.03 Submittals

Obtain approval of the mix design from the Office of Materials and Research before using the mix.

### 452.2 Materials

Ensure that materials used in full depth slab replacement conform to the following Specifications:

Material	Section
Twenty-Four Hour Accelerated Strength Concrete	Section 504
Dowel Bars and Bar Coatings	Subsection 853.2.08
Epoxy	Section 886
Silicone Sealant	Subsection 833.2.06

**452.2.01 Delivery, Storage, and Handling**

General Provisions 101 through 150.

**452.3 Construction Requirements****452.3.01 Personnel**

Furnish traffic control while the Department conducts slab movement testing described in Subsection 452.3.06.B. “Quality of Work” at no additional cost to the Department.

**452.3.02 Equipment**

Use sufficient equipment to perform work such as drilling dowel holes, setting dowels, spreading, striking off, consolidating, screeding concrete, and sawing and sealing joints. Obtain the Engineer’s approval of the equipment before starting the work.

Place the dowels at the locations specified on the Plans by using pneumatic or hydraulic drills and bits that will drill a 1-3/8 in (35 mm) diameter hole in the existing concrete faces.

**452.3.03 Preparation****A. Clean the Exposed Faces**

Before placing the concrete, thoroughly clean the vertical exposed faces of the existing slabs to remove contaminants.

1. Use wire brushing or other methods approved by the Engineer.
2. Remove existing silicone or other joint sealant from the exposed concrete faces.

**B. Preparing Base**

Remove debris and standing water from the base. Thoroughly compact loose base material by hand tamping before placing concrete.

**452.3.04 Fabrication**

General Provisions 101 through 150.

**452.3.05 Construction****A. Installing the Dowels**

Complete these steps to install the dowels:

1. Use a pneumatic or hydraulic drill to drill a 1-3/8 in (35 mm) diameter hole in the existing concrete faces. Place the dowels at locations specified on the Plans.
2. If the Engineer allows, drill a hole no greater than 1.5 in (38 mm) diameter to insert the dowel bars. Follow these guidelines:
  - a. Operate the equipment so as to prevent damage to the pavement being drilled.
  - b. Obtain the Engineer’s approval for the drilling procedure.
  - c. Thoroughly clean the drilled holes of contaminants.
3. Set the type and size of dowels specified in the Plans into the hardened concrete face of the existing pavement with Type VIII epoxy bonding compound that meets the requirements in Section 886.
  - a. Place the dowels at locations noted on the Plans with one-half of the dowel protruding out of the pavement.
  - b. Place the dowels at the correct horizontal and vertical alignment. Do not misalign them more than 3/8 in (10 mm) within the vertical or oblique plane.
  - c. Place enough epoxy in the back of the hole to completely fill the entire cavity around the dowel upon insertion of the dowel bar. Remove excess epoxy.
  - d. Use epoxy adhesive packaged in a cartridge with a mixing nozzle that thoroughly mixes the two components as they are dispensed. Use a mixing nozzle at least 8 in (200 mm) long.  
Or, use a machine that mixes the two components thoroughly to the proper ratio as the material is being placed.
  - e. Allow the epoxy to harden before placing the concrete to prevent the dowels from moving during the concrete placement.
4. At the free joints shown on the Plans, use epoxy-coated, plain, round, steel dowel bars that meet the requirements of Subsection 853.2.08.

Coat the protruding portion of the epoxy coated dowels with a thin film of grease or other approved material to ensure proper bond-breaking characteristics.

5. Cleanly saw the edges of the epoxy-coated smooth dowels bars. Do not shear them.

**NOTE 1: Never drive dowels into a dowel hole with a sledge hammer or other device.**

**NOTE 2: Coated dowels will be rejected if they cannot be freely inserted into a dowel hole.**

## B. Setting Forms

Forms are not required for this work. The vertical faces of the existing pavement and shoulder bordering the replaced slab or joint area serve as the forms.

However, if the shoulder is irregular or unstable:

1. Place a form the full depth of the replaced slab or joint area to maintain a true, straight shoulder joint and to prevent the concrete from intruding into the shoulder area.
2. Compact the foundation under the form true to grade so that the form, when set, will firmly contact the base at the correct grade.
3. Clean and oil the forms before placing the concrete.
4. Wait four hours to remove the forms from the freshly placed concrete, unless otherwise specified. Carefully remove the forms to avoid damaging the pavement.
5. Repair the shoulder to the Engineer's satisfaction at no additional cost to the Department.

## C. Placing and Finishing Concrete

The required concrete for the work will be 24-hour accelerated strength concrete that meets the requirements of Section 504. Obtain mix design approval from the Laboratory before use.

Place the concrete only when the ambient temperature is 40 °F (4 °C) and rising. Do not place concrete when the underlying base material is muddy or frozen.

1. Deposit the concrete within the slab replacement area in a way that requires as little rehandling as possible and prevents mix segregation.
2. Minimize hand spreading as much as possible. But where necessary, use shovels not rakes.

**NOTE: Do not allow workmen to walk in fresh concrete with shoes coated with earth or other foreign substances.**

3. Fill the replaced slab area with concrete and thoroughly consolidate by rodding, spading, and using sufficient vibration to form a dense homogeneous mass throughout the area.
4. Ensure the final surface area has a uniform appearance and is free of irregularities and porous areas.  
The finished surface, including joints, shall meet a surface tolerance of 1/8 in. in 10 ft (3 mm in 3 m) in any direction.

For slab replacements done in preparation for resurfacing of the pavement, the finished surface, including joints, shall meet a surface tolerance of 3/16 in. in 10 ft (5 mm in 3 m) in any direction.

Perform necessary corrections by grinding according to Section 431. The Engineer may order replacement if any replaced slab is low in relation to adjacent slabs. The Engineer will require replacement if it is determined that excessive pavement grinding is necessary to match the profile of the full depth slab replacement or if grinding the adjacent pavement would create a drainage problem.

Do the following at no additional cost to the Department:

- Perform all necessary corrections
- Furnish all necessary traffic control personnel, materials, and equipment to detect deviations.
- Grind or replace slabs to correct surface tolerance deviations

If the Project involves resurfacing or grinding the pavement surface, a flat finish will be satisfactory. Otherwise, a broom or hand-tine finish will be required that will produce a surface texture depth of 0.20 in. (5mm) or greater as measured by GDT 72. The Engineer shall approve the finishing method and any deficient areas corrected to his or her satisfaction and performed at your expense.

**D. Curing Concrete**

Use the applicable portions of Section 504 regarding concrete mix and curing in this work.

**E. Sawing and Sealing Joints**

Establish transverse and longitudinal joints within the slab replacement area by doing the following:

1. Saw and seal the joints with silicone sealant that meets the requirements of Subsection 833.2.06. Seal according to Plan details and Section 461.
2. Ensure that the width of the sawed joints is 3/8 in (10 mm) , unless otherwise directed.
3. Saw and seal the joints as soon as possible, but not more than 60 days after placing the slab, unless the Plans specify otherwise.

Sawing and sealing of the reestablished joints is included in the bid cost for slab replacement.

**F. Protecting from Rain**

Properly protect the concrete from rain before the concrete hardens by following these guidelines:

1. Keep the materials to protect the concrete surface available at all times.  
Protective materials include burlap or cotton mats, curing paper, or plastic sheeting material.
2. When rain is imminent, stop the paving operations and begin covering the surface of the unhardened concrete with the protective covering.

**G. Working at Night**

If night work is authorized on the Project, provide lighting for work performed at night for safety, traffic control, and work control and completion.

Correct unsatisfactory work to the Engineer's satisfaction at no additional cost to the Department.

**H. Opening to Traffic**

Schedule slab replacements so that the concrete will have a curing time of at least four hours. Complete the work and open the lanes to traffic before sunset the day it is placed, unless authorized otherwise.

The Engineer may require a longer curing period, mix design adjustments, or other corrective action to ensure sufficient concrete strength development before opening to traffic.

**452.3.06 Quality Acceptance****A. Surface Tolerance**

Ensure that the finished surface tolerance, including joints, is 1/8 in per 10 ft (3 mm in 3 m) in any direction. Make corrections by grinding according to applicable items in Section 431.

**B. Quality of Work**

Complete work that meets the requirements in the Specifications and Plans.

Until Final Acceptance of this work, replace damaged or broken slabs due to the following:

- Improper or unsatisfactory methods, equipment, or materials
- Construction or public traffic

Replace the slabs at no additional cost to the Department. The Department may also require removal and replacement of repaired slabs with a differential movement at the transverse joints greater than 0.01 in (0.25 mm) at no cost to the Department. The Department will measure the movement using an 18,000 lb (8165 kg) , single-axle load with dual tires and with the axial load centered 1 ft (300 mm) from the edge of the shoulders as close to the transverse joints as possible. Testing will be done between 3:00 AM and 9:00 AM when slab movement is the greatest. The movement will be measured using dial gauges that can detect movement to the nearest 0.001in (0.025 mm). .

The Engineer will determine whether the slab movement test is required.

**452.3.07 Contractor Warranty and Maintenance**

General Provisions 101 through 150.

**452.4 Measurement**

Full depth replacement slabs are measured for payment by the cubic yard (meter) using the average squared dimensions times the average depth.

Dowels and dowel placement are not measured for separate payment but are included in the Unit Price bid for full depth slab replacement.

**452.4.01 Limits**

General Provisions 101 through 150.

**452.5 Payment**

Full depth replacement slabs will be paid for at the Contract Unit Price per cubic yard (meter). Payment is full compensation for:

- Furnishing materials including dowels, epoxy, and 24-hour accelerated strength concrete
- Performing work such as repairing shoulders if required, removing unsatisfactory material, sawing and sealing new joints, and performing other work specified in this Specification

Payment will be made under:

Item No. 452	Full depth slab replacement	Per cubic yard (meter)
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**452.5.01 Adjustments**

General Provisions 101 through 150.

**Section 453—Portland Cement Concrete Whitetopping****453.1 General Description**

Specifications for this work will be included elsewhere in the Contract.

**Section 455—Filter Fabric for Embankment Stabilization****455.1 General Description**

This work consists of placing filter fabric for embankment stabilization as shown in the Plans or as directed by the Engineer.

**455.1.01 Definitions**

General Provisions 101 through 150.

**455.1.02 Related References****A. Standard Specifications**

Section 881—Fabrics

**B. Referenced Documents**

General Provisions 101 through 150.

**455.1.03 Submittals**

General Provisions 101 through 150.

**455.2 Materials**

Use filter fabric that meets the requirements of Subsection 881.2.08, “Filter Fabric for Embankment Stabilization”.

**455.2.01 Delivery, Storage, and Handling**

General Provisions 101 through 150.